IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Applicant: UNO ET AL.
Serial No. 09/390,228 Group Art Unit: 1756
Filed: SEPTEMBER 3, 1999 Examiner: M. ANGEBRANNDT
Title: OPTICAL INFORMATION RECORDING MEDIUM, PRODUCING METHOD THEREOF AND METHOD OF RECORDING/ERASING /REPRODUCING INFORMATION

DECLARATION UNDER 37 C.F.R. 1.132

HON. COMMISIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C, 20231

SIR:

I, Rie KOJIMA, hereby declare follows:

I was born on March 19, 1964 in Nara, Japan, graduated from Department of Physics, Faculty of Science, Nara Women's University, in March 25, 1986, holding a Bachelor of Science. I then joined Matsushita Electric Industrial Co., Ltd in April 1, 1986 and was engaged in research and development to bring magneto–optical and phase–change optical disks to market in Disk Systems Department, and have been engaged in research and development of materials for a phase–change optical disk in Optical Disk Systems Development Center since 1988.

I am the first inventor of US 6,416,837 for "INFORMATION RECORDING MEDIUM, A METHOD FOR MANUFACTURING THE SAME AND A METHOD FOR RECORDING/REPRODUCING INFORMATION THEREON" and one of the joint inventors in some other patents. I wrote three theses: "Quantitative Study of Nitrogen Doping Effect on Cyclability of Ge–Sb–Te Phase–Change Optical Disks"; SPIE (the Society of Photo–Optical Instrumentation Engineers) vol. 3401 (1998); "Nitrogen Doping Effect on Phase Change Optical Disks", Jpn. J. Appl. Phys. Vol.37 (1998) pp. 2098–2103; and "Acceleration of Crystallization Speed by Sn Addition to Ge–Sb–Te Phase–Change Recording Material", Jpn. J. Appl. Phys. Vol. 40 (2001) pp. 5930–5937.

From my education and subsequent work experience, I consider myself to be familiar with magneto–optical and phase–change information recording systems, including the materials used and how persons skilled in the art view the relationships between the systems.

·Difference between Magneto–optical Recording Medium and Phase–change Recording Medium

A magneto–optical recording medium and a phase–change recording medium both are characterized in that information is recorded and reproduced optically. However, their recording principles and recording materials are totally different from each other. In magneto–optical recording, a recording layer is magnetized and read–out is performed optically using the Kerr effect. On the other hand, in phase–change recording, the phase transitions such as crystalline–amorphous transitions in a recording layer yield a change in reflection. Therefore, a technology that can be used for the magneto–optical recording medium cannot be used as the technology for the phase–change recording medium. Accordingly, one technology cannot be referred to for the other.

One of the differences lies in adhesion between a recording layer and a protective layer that is provided in contact with the recording layer. Although the magneto–optical recording medium also includes the protective layer provided in contact with the recording layer as in the phase–change recording medium, virtually no problem is caused with respect to the adhesion between the recording layer and the protective layer. Therefore, it is possible to use a wide range of materials.

On the other hand, in the phase–change recording medium, problems tend to arise in the adhesion between the recording layer and the protective layer provided in contact with the recording layer. The recording layer of the phase–change recording medium is formed of a material that changes reversibly between a crystal state and an amorphous state. More specifically, a material containing Te, Se, Sb or the like as a principal component, which is called a chalcogen compound, is used. In many cases, the volume of such a material varies with the changes in state mentioned above. The volume in the crystal state is about 4% to 10% smaller than that in the amorphous state. Thus, when a heat load is caused by repeated recording or moisture enters the medium, the protective layer may peel off

from the recording layer easily. Accordingly, for the protective layer provided in contact with the recording layer, it is necessary to select carefully a material that has a great affinity for a phase–change recording material and has excellent adhesion thereto. This selection requires a sophisticated technology.

In contrast, there is no need to worry about such adhesion in the case of the magneto–optical recording medium. In principle, it is possible to use a wide range of dielectric materials as the protective layer. The adhesion does not matter very much in the magneto–optical recording medium probably because, owing to the difference in recording mechanisms, the volume of the recording layer does not vary with the changes in state unlike the above case. Another possible reason is that TbFeCo, which is used generally as the recording layer material of this medium, tends to undergo oxidation. In particular, Tb is a rare earth element and has a great tendency to undergo oxidation. Therefore, Tb can reduce the protective layer material and form a strong bond at an interface between the recording layer and the protective layer. This is considered to be the reason for the excellent adhesion between the recording layer and the protective layer.

Therefore, in my opinion, due the basic difference between the systems persons skilled in this field would have no reasonable basis to expect that materials used in a magneto–optical system could be used successfully in a phase change system. This is a particularly true of materials used for protecting a recording layer.

I further declare under the penalty of perjury of the laws of the United States that the foregoing is true and correct to the best of my information and belief.

Signed this September 9 , 2002, at Osaka Japan

Rie Kojima

Rie KOJIMA

OPTICAL RECORD MEDIUM AND METHOD TO MANUFACTURE OPTICAL RECORD MEDIUM

Patent Number: JP4052188
Publication date: 1992-02-20
Inventor(s): YOSHIOKA KAZUMI; others: 03
Applicant(s): MATSUSHITA ELECTRIC IND CO LTD
Requested Patent: JP4052188
Application Number: JP19900160735 19900619
Priority Number(s):
IPC Classification: B41M5/26; G11B7/24; G11B7/26
EC Classification:
Equivalents: JP3136153B2

Abstract

PURPOSE:To restrain a record thin film material from moving along a guide groove even if pulsation of a protective layer occurs due to repetition of recording and erasion so as to improve repeating property by making nitrogen contained in the record thin film.
CONSTITUTION:A disk base plate 1 constituted of transparent resin has an optical record medium arranged on the surface thereof. The optical record medium is made of a first dielectric layer 2, a record thin film 3, a nitride layer 4, a second dielectric layer 5 constituted of the same material as the first dielectric layer 2, and a reflecting layer 6. The record thin film 3 of a disk in a rotating state is irradiated with laser beam so as to make the temperature up to the melting point or more and to melt it. Thereafter, it is cooled gradually and initialized, so that the nitride layer 4 arranged adjacently to the record thin film 3 also melts at the same time. Therefore, it is mixed to the record thin film 3 in a melting state, so that the nitrogen will be incorporated into the record thin film 3. As a result, the quality of the record thin film 3 changes, so that a moving phenomenon of the record film material along a guide groove due to pulsation of a protective film can be restrained.